THE ARTEFACT ASSEMBLAGE FROM THE OPITO BEACH MIDDEN, N40/3, COROMANDEL PENINSULA

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Abstract. The artefact assemblage from the Archaic midden site, N40/3, at Opito Bay on the Coromandel Peninsula is described. The assemblage is readily comparable with material from other early sites in the region, notably Hot Water Beach (N44/69) and Harataonga Bay on Great Barrier Island (N30/5).

The excavation of an Archaic midden, now designated site N40/3, at Opito Bay on the Coromandel Peninsula, was carried out as part of a research programme into the New Zealand Archaic, initiated by the Auckland University Archaeological Society in the mid 1950s. In view of the frequent occurrence of 'Moa Hunter' artefacts on the East Coast of the Coromandel Peninsula, field exploration was concentrated in this area, with the aim of discovering and excavating a Moa Hunter site. In the summer of 1956-57 Jack Golson directed the first major excavation in the area, at Sarah's Gully, a short distance from Opito Bay. At the start of the second season's work at Sarah's Gully, in late 1957, Mr R.H. Chapman of Opito Bay reported that artefacts were being eroded by high tides from a dune just north of a large creek running into the bay (for location see Davidson and Green 1975:45 and Fig. 1). The richness of the new site was confirmed by some of the members of the excavation team at Sarah's Gully who tested the area and recovered sufficient evidence that it was worth excavation (Golson 1959b:13).

Two days' excavation of the Opito site was carried out by the full excavation team in January 1958. A trench roughly 12.5 x 3 m, an area of some 37.5 m sq., was cut across the dune to a depth of 1.4 m. This was divided into three 1.8 m, four 1.5 m and one 0.9 m rectangles. The stratigraphy of the deposits was reasonably clear. An overburden of whitish granular sand covered the site to a depth of 0.6-0.8 m. There was evidence of late occupation with few remains at a high level in the dune series, while the main cultural deposit occurred at the base. This consisted of a composite series of three layers 0.4 m thick, very rich in faunal and artefactual remains (layers 4A to 4C). The upper layer of the series was blackened with cooking fires, and a *haangi* was found in Rectangle 2. In some parts of the site the middle layer was associated with a thin spread of small waterworn pumice pebbles. The lowest layer was the richest in artefactual material, and as excavation proceeded, this had all the appearance of a working floor, with stone flakes, broken and half-finished adzes and bone material occurring in a compacted layer just above natural.

A second excavation was carried out in January 1959, primarily to investigate the pumice. During the 1958 season nothing further had been done beyond noting its occurrence, but in the light of Dr Wellman's work on Loisel's or black pumice, it was decided to investigate its occurrence in the Opito site in more detail. A small section was cut adjacent to the 1957-58 excavation to collect pumice from all levels of the site, and subsequently

Rec. Auckland Inst. Mus. 17: 65-95 17 December 1980

excavated down into the underlying beach deposits. White pumice occurred at all levels of the site, but all Loisel's pumice lay above the lower half of the sand layers dividing the two main culture horizons at the base of the deposit.

A third brief excavation was carried out in May 1959. The main aim was to correlate the black pumice of 1958-59 with the radiocarbon date obtained in the first season of excavation. It was also possible to correlate the stratigraphy recorded during the previous two seasons of excavation with greater precision.

The Opito site was reopened in early 1962 by R.G.W. Jolly and D. Trower, who carried out a brief excavation. An area roughly 3 x 1 m was opened, but its precise location in relation to the Golson excavations is not clear. No definite occupation layer was encountered. A brief report of this excavation was published, together with a list of the artefacts recovered (Trower 1962).

FISHING GEAR

Evidence of fishing was present in all layers of the site, in the form of fish-hooks, both finished and unfinished, and the residue of their manufacture. As Table 1 shows, the majority of material came from Layers 4A to 4C, notably Layer 4C. Layer 3 only yielded one finished fish-hook fragment.

Table 1. Fishing gear.

Layer	Finished 1 piece hooks				Unfinished 1 piece hooks	Lure hooks	Cores	Tabs	Lure shanks
	complete	shank leg	point leg	total					
3		1		1					
4A	1	6	8	15	16		20	1	
4B	2	24	10	36	30	1	21	1	1
4C	5	54	23	82	50	3	42	10	4
	8	85	41	134	96	4	83	12	5

Fish-hooks (Figs. 1-11)

All but four of the fish-hooks recovered were one piece oval hooks with incurved points, manufactured from moa bone. Classified by Crosby (1966:187) as Opito type 1, this type of hook is the most common form found in early sites in the north of the North Island (Golson 1959a:45, Nicholls 1963:23). In the following discussion, the descriptive terms used are those adopted by Smart (1961).

A total of 230 one piece fish-hooks and hook fragments were recovered, 134 finished and 96 unfinished. Of the finished hooks, only 8 were complete. The remainder, presumably broken during use, had generally snapped across the grain at the base or the lower part of the point leg. The curve between the shank leg and point leg appears to be the area under greatest stress in bone hooks such as these. Thus, out of 126 fragments of finished hooks, 85, or 69% were broken across the base or the lower part of the point leg, while the shank leg was largely intact.

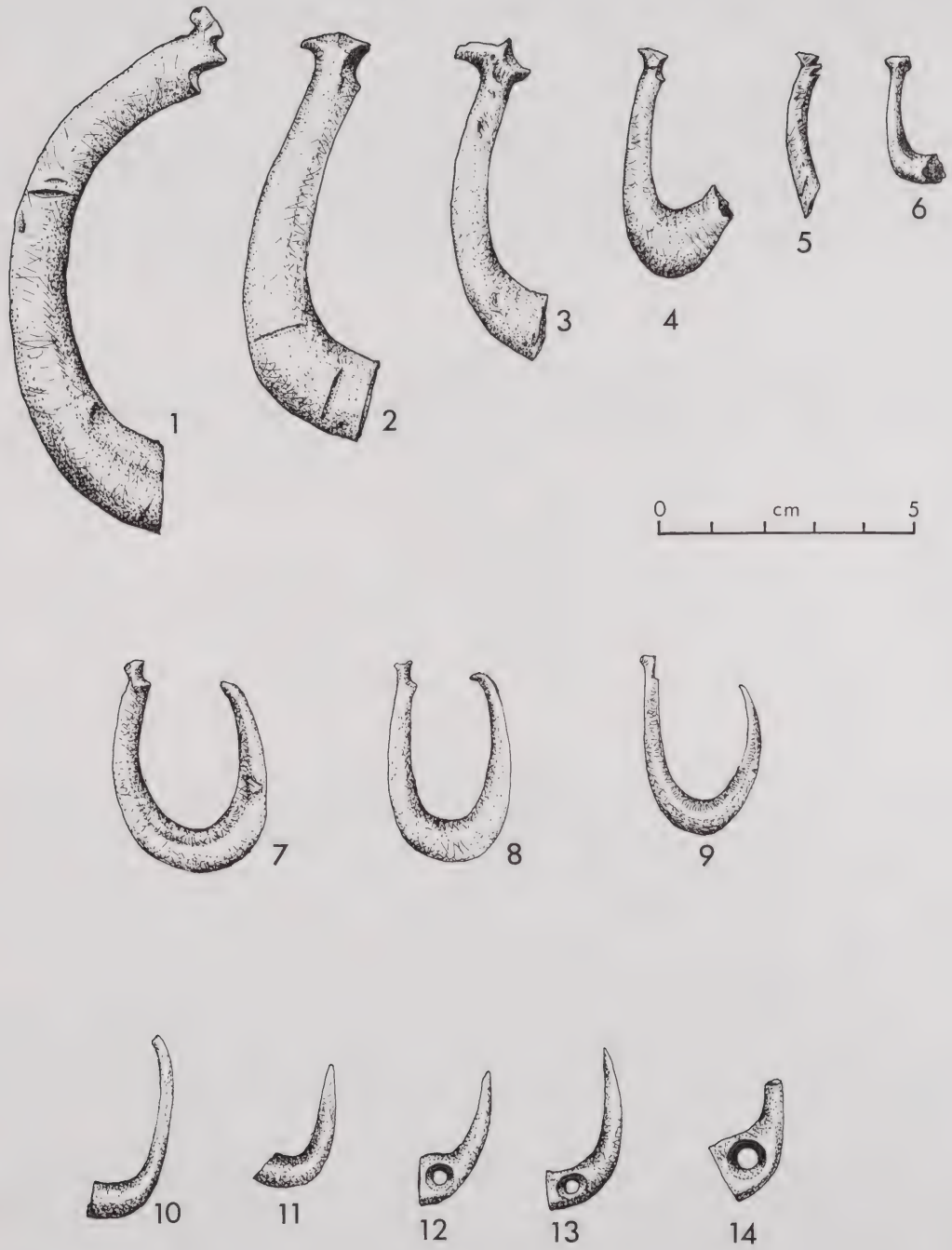
Characteristic of Crosby's Opito type 1, the one piece fish-hooks in this assemblage are oval in outline with the shank head slightly extended above the point. The shank heads show some variety in form, although there is generally a simple step on the inner side and a shallow concavity on the outside for line attachment. The top of the shank head is generally either flat or notched. All the points are unbarbed, and the tips of most are incurved to some degree. Only a few examples have any modification for bait attachment.

Table 2 gives the size of the longest and shortest fish-hooks in each layer, the mean length and the number of hooks measured in each. Although all hook fragments were measured, for the purpose of this table only the complete hooks and those which had broken across the base and had complete shank or point legs have been included. The table reveals a considerable size range of fish-hooks in the site. Layer 4B has the widest range, 1.8-10.4 cm in length, although the average length of hooks is greatest in Layer 4C.

Table 2. Numbers and lengths of finished one piece fish-hooks

Layer	Number	Length (cm)		Average
		maximum	minimum	
3	1	3.7		3.7
4A	11	6.7	2.6	4.4
4B	20	10.4	1.8	4.8
4C	45	8.0	2.6	5.6
	77			

2/4A/20 (Fig. 9) is a slender hook with only slightly incurved point. There is a shallow bait notch halfway up the point leg on the outside. The tip of the lashing head has broken off, but judging by the size of the hook, this would not be very large. 2/4C/113 (Fig. 4) has the flat topped form of lashing head, with the usual simple step on the inside, ending in a small knob. There are two lashing grooves on the head itself, one running horizontally from the step, the other diagonally from the top. The base of this hook is relatively wide, probably to counteract the weakness of bone hooks at this point. The usual oval cross-section is laterally flattened in this area, to give additional strength. 5/4C/65 (Fig. 2) is a much larger example. It has a flat topped lashing head and two bait notches on the shank leg close to the base. 6/4C/40 (Fig. 3) is a very large hook with an extended lashing head. The top of the head is slightly concave, compared to the flat tops of the previous examples. Extended lashing heads are a feature of fish-hooks from Wairau and Shag River; these are slightly larger than Opito type 1 hooks, but otherwise similar in form. Crosby (1966: 191) classifies this form of hook as the Shag variety, a subgroup of the major early group of fish-hooks, Opito type 1. Only the shank leg is intact in X/4B/7 (Fig. 5). However, the lashing head has an unusual double notched profile on the inside. The outside has the common single notch. The inward curve of the tip of the point is particularly marked in 3-4/4C/58 (Fig. 8). There is a shallow notch on the top of the lashing head, similar to the hook illustrated in Fig. 4.



Figs. 1-14. Bone fishing gear. 1-11. One piece hooks and fragments. 12-14. Lure points. 6, 9. Layer 4A. 1, 5, 12. Layer 4B. Remainder, Layer 4C.

6/4A/10 and X/4B/5 (Figs. 6, 1) illustrate the considerable size range of the hooks recovered. The large specimen has two notches for attaching bait, on the outside of the shank leg towards the head. There is a marked notch in the top of the lashing head, in contrast to the flat top of the small hook. The two point legs in Figs. 10 and 11 are examples of two different forms. One has the common slender incurved point while the other has a shorter, facetted point, although the diameter at the base is similar in both. The latter hook conforms to Crosby's Opito II variety, which she interprets as a reused Opito I hook, the broken tip having been refashioned to a simple jabbing point.

Composite lure hooks (Figs. 12-14)

Evidence of trolling is provided by four lure points. Three, all made from bone, were found in Layer 4C. The fourth, from Layer 4B, is made from a tooth, the mandibular canine of the N.Z. fur seal (Fig. 12). Two of the bone points are illustrated in Figs. 13, 14. All four points are unbarbed, and have deeply curved outlines. They are uniperforate, with a wide flat base. Lure points of similar form have been recovered from other early sites in the region, one from Hot Water Beach (Leahy 1974:39) and one from Harataonga Bay on Great Barrier Island (Law 1972:87). The lure points from Opito thus conform to the characteristic pattern for the area. Seven pieces of worked shell were recovered. They are discussed in more detail below, as ornaments, but five of these could also be lure shanks. Although they lack any modification for lashing at the tip, they are of characteristic elongated oval shape with rounded top and single hole (for example, Fig. 29). Crosby (1966:148) notes that the distribution of drilled deep curve points in the North Island corresponds closely to that of the early Dorso-Ventral series of shanks. There is also evidence of association between this type of lure point and another early form of lure shank, the grooved shank. Law (1972:87) describes a grooved lure shank from a Settlement Phase site at Harataonga Bay (site N30/5), the same site from which the uniperforate lure point mentioned above was recovered.

Fish-hook manufacture (Figs. 15-22)

There is ample evidence for the manufacture of fish-hooks on the site. As in the case of finished hooks, this is concentrated in Layers 4A to 4C. All stages of the manufacturing process are represented, from the prepared bone tabs shaped to the desired outline of the hook to the unfinished hooks with scalloped inside curves left by drill holes.

As Table 1 shows, the most common remains of fish-hook manufacture were cores, the waste pieces of bone drilled from the centre of the tab in shaping the inside curve of the hook; a total of 85 were recovered. Ninety-six unfinished hooks were recovered, all from Layers 4A to 4C. Length measurements were made of all the cores and most of the unfinished hooks in order to get an estimate of the size of the original tabs and resulting hook. Some idea of the relative sizes of core and hook can be obtained from two examples of unfinished hooks which still have cores attached. 5/4C/54 (Fig. 18) is 5 cm long, and the attached core 2.8 cm; 5/4A/16 is 4.5 cm long, the core 1.7 cm.

Table 3 gives the number of cores in each layer, the size of the longest and shortest, and the mean length. Similar length measurements are given for unfinished hooks in Table 4. As in Table 2, only those hooks which were broken across the base and thus have complete shank or point legs have been included.

Table 3. Numbers and lengths of bone fish-hook cores.

Layer	Number	Length (cm) maximum	minimum	Average
4A	20	4.4	1.2	2.5
4B	21	3.6	1.3	2.7
4C	42	5.2	1.4	3.1

Table 4. Numbers and lengths of unfinished one piece fish-hooks.

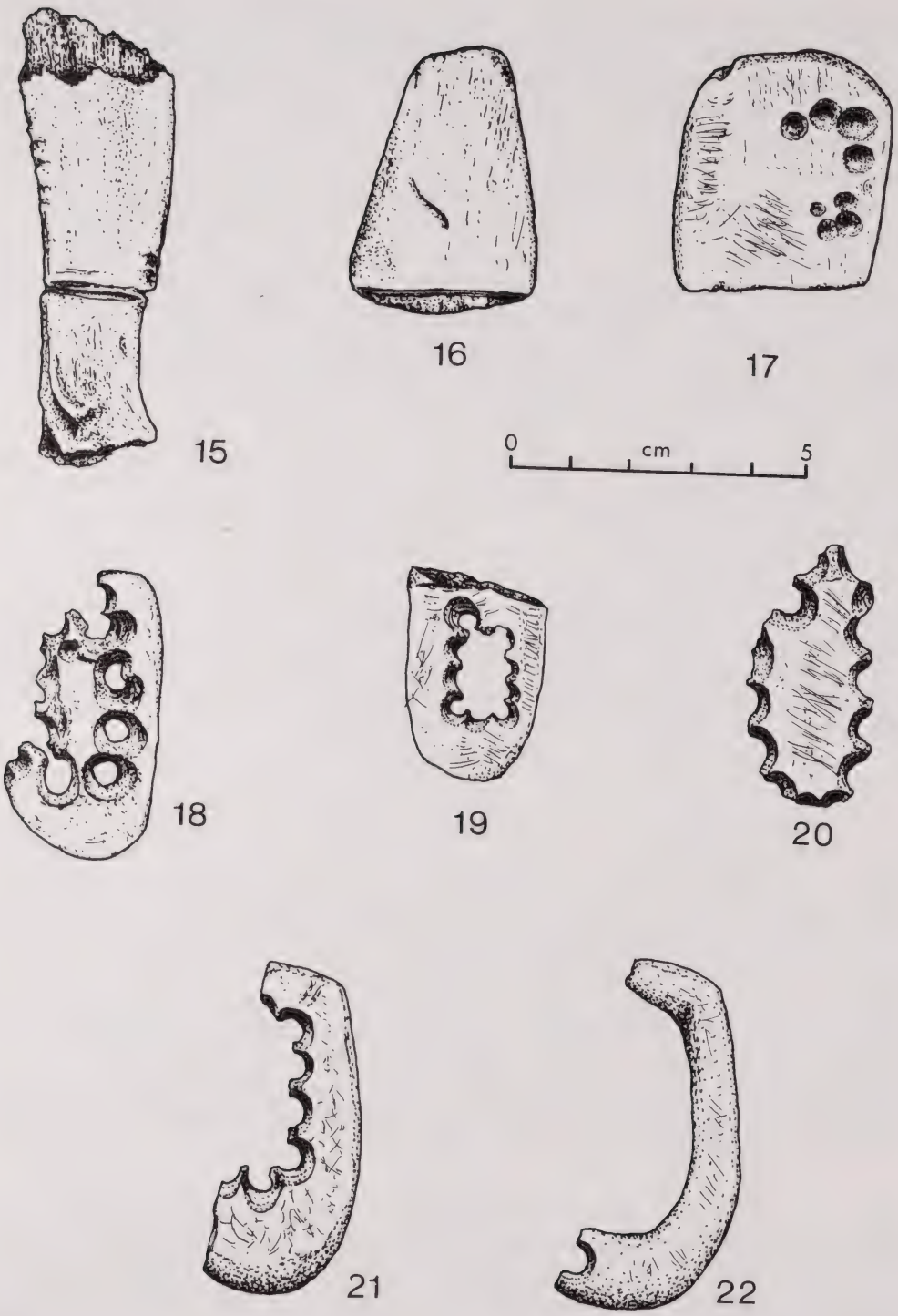
Layer	Number	Length (cm) maximum	minimum	Average
4A	5	5.0	4.2	4.5
4B	18	8.2	3.2	4.5
4C	38	8.4	3.5	4.6

The results for cores parallel the trends evident in the figures for finished hooks. The average length of cores is greatest in Layer 4C and least in Layer 4A, just as the average length of finished hooks is greatest in Layer 4C and least in Layer 4A. This is indicative of a trend towards smaller hooks through time, the fish-hooks in earlier layers being on average larger. The total numbers of both cores and finished hooks also decrease through time, as do those of the unfinished hooks.

The fish-hooks from Opito are relatively large. This can be seen by comparing the sizes of cores from Hot Water Beach with those from Opito. The cores from Hot Water Beach range in length 0.7-3.4 cm, while those from Opito range 1.2-5.2 cm. Leahy (1974:36) considers that any core over 3 cm long would probably produce a large hook for the Hot Water Beach site. In Layer 5 of this site, for example, only 8 out of 96 cores were over 3 cm long. In contrast, 23 out of 42 cores in Layer 4C of the Opito site were over 3 cm long, more than 50%.

Figs. 15-22 illustrate the stages in the manufacture of one piece fish-hooks. First a suitable flat piece of bone was cut, in this case by sawing (Fig. 15). The tab was then shaped to almost the exact outline and thickness desired for the finished hook (Fig. 16). The inside curve was shaped by drilling a series of holes from each side of the tab and knocking out the central core (Figs. 17-21). The hook was finished by smoothing the inside curve and shaping the shank head and point to the desired form. The hook fragment illustrated in Fig. 22, smoothly finished except for the angle formed by the top edge of the original tab, suggests that the shaping of shank head and point was left until last.

The large number of unfinished hooks and cores present in the site relative to the number of tabs (only 12 complete tabs and 13 fragments) suggests that the tabs were prepared elsewhere, and the main activity on the site was the actual shaping of hooks. In addition to the partially cut piece of bone in Fig. 15, there were only two other large pieces of bone which could have provided raw material for the manufacture of fish-hooks, one from Layer 4B and one from Layer 4C. Both are joint heads, cut by drilling holes from



Figs. 15-22. Bone fish-hook manufacture. 15-17, 19. Tabs. 18. Tab and core. 20. Core. 21-22. Partially finished hooks. 20. Layer 4A. 16, 21. Layer 4B. Remainder, Layer 4C.

both sides. Leahy (1974:36) notes that at the Mt. Camel site (N6/4), some large bone tabs were made from the wide flat area just below the joint heads of long bones; Fig. 15 shows just this technique. Of the prepared tabs from Opito, all except one have been shaped, and three have one or two partially drilled holes.

Conclusions

The fishing gear recovered from Opito is indicative of an emphasis on line fishing. In the absence of any other form of small hanging hook, it is probable that the Opito 1 type hook which forms the bulk of the assemblage was used to take a wide variety of sub-surface fish. This interpretation is supported by the wide size range of the hooks recovered, 1.8-10.4 cm. One fish species which has been associated with the Opito 1 hook is snapper. Crosby (1966:208) cites evidence that the point of an oval one piece hook of Opito 1 type was found in apparent primary association with the head bones of a snapper at another site on Opito Bay, N40/2.

The only other type of fishing equipment recovered was the lure or trolling hook point, limited to four examples, and five possible lure shanks. There is no indication of any major change in fishing technology within the main cultural layers. However, the decrease in sizes and numbers of fish-hooks and cores from Layer 4C to 4A points to an increasing scarcity of moa bone through time. A very similar pattern can be seen in the material from Hot Water Beach and Harataonga Bay. In both these sites there is a preponderance of Opito type 1 hooks, and limited evidence for trolling. Moreover, Leahy (1974:36) notes a decrease in cores in the upper layers of Hot Water Beach. When seen in this wider context, the material from Opito clearly forms part of the homogeneous and well established cultural tradition in the Coromandel area.

ORNAMENTS (Figs. 23-31, 35, 36)

A number of artefacts in bone and shell, presumed to be ornaments, were found, all in Layers 4A to 4C. The most commonly occurring forms were plain bone tubes or reels; 78 were recovered. Cut from sections of long bones, these artefacts are unequivocally archaic, similar to those recorded from Wairau Bar (Duff 1956:Fig. 17). In the case of Opito they are mainly manufactured from dog bone; two examples, 5/4C/51 and 2/4C/77, are made from the femur of a dog. Fifty-six of the reels in Layer 4C and five in Layer 4B are dog bone; the remainder, a total of seventeen, are manufactured from bird bone (R. Cassels, pers. comm.). Duff (1956:95) records the use of dog bone, human bone and the bone of the extinct swan in addition to moa bone for the manufacture of bone reels at Wairau Bar. Table 5 gives the number of reels found in each layer and the maximum, minimum and mean values for length and diameter. The overall range in length is 1.8 cm, and the range in diameter rather less, 1.2 cm.

Table 5. Numbers and sizes of bone reels.

Layer	Number	Length (cm)			Diameter (cm)		
		maximum	minimum	mean	maximum	minimum	mean
4A							
4B	9	2.3	1.0	1.6	1.3	0.5	0.8
4C	69	1.9	0.5	1.2	1.6	0.4	0.8

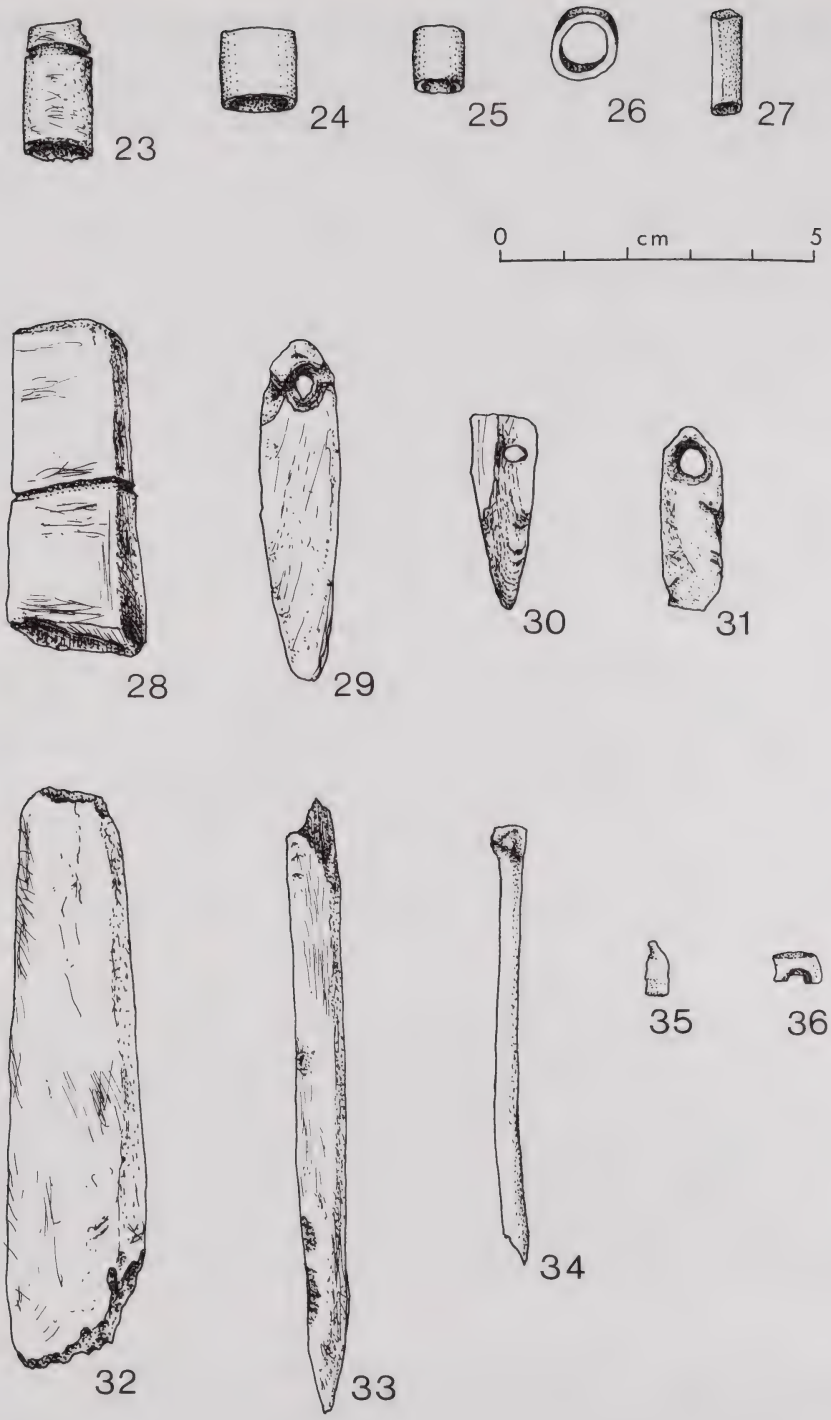
Three unfinished bone reels, found in Layer 4C, provide evidence of techniques used to manufacture this type of ornament. 3/4C/34 (Fig. 28) shows how sections were cut by grooving around the circumference then sawing through. The other two examples have broken during manufacture and been abandoned. In Fig. 23 (5/4C/51) the second reel of the pair has broken off, leaving a jagged point. The other specimen (not figured), also a pair of reels, has split longitudinally. Three heads of small diameter long bones with sawn ends, one from Layer 4C and two from Layer 4B, are probably waste material from the manufacture of bone reels.

A total of 17 tube like sections of *Dentalium nanum* shell were found, 1 in Layer 4A, 9 in Layer 4B and 8 in Layer 4C. They are all small in diameter (0.2-0.3 cm) and range in length 0.7-3 cm. They do not appear to have been worked; it is probable that they would have been cut into small sections to form necklace units. The use of *Dentalium* shell for ornaments, presumably strung as necklaces, has long been regarded as characteristic of Archaic assemblages; Duff (1956:P1.13) illustrates two such necklaces, one from Dunback, North Otago, and one from Wairau. According to Duff (1956:97) these were made by scoring the parent shell then cutting it into thin sections. One other necklace unit, made from ivory was found in Layer 4A (3/4A/18). It is plain, smoothly finished and 1.1 cm in diameter (Fig. 26).

Both Golson (1959a) and Groube (1968), in their discussions of artefact distribution through time place *Dentalium* shell firmly in the Archaic. However, there is evidence that both *Dentalium* shell and cut bone tubes occur right through to the contact period. Orchiston (1972:104) cites evidence for the use of sections of *Dentalium* shell and cut bird bone in necklaces, anklets and bracelets in protohistoric times. Leach (1977) also makes this point, and goes on to detail the different species of *Dentalium* available in New Zealand, their habitats, and the variety of items in which they were used. These range from necklaces, anklets and bracelets to the borders of woven bands and capes.

Seven pieces of worked shell, probably ornaments, were recovered, six from Layer 4C and one from Layer 4B. The specimen from Layer 4B (Fig. 29) is particularly well-preserved. It is an elongated oval shaped 'pendant' made of oyster shell (W. Cernohorsky, pers. comm.), with rounded top and single hole. Duff (1956:P1.23) illustrates a shell pendant of very similar form from Wairau Bar. Three of the pieces of worked shell from Layer 4C suggest ornaments of similar form, although two are broken. None are pierced, but one (6/4C/9) has two partially drilled holes on one surface at the wider end. As noted above, these four specimens could also be lure shanks. Indeed, in Duff's description of pendants, he adds that they suggest the form of lure fish-hook shanks (Duff 1956:134).

The three other shell ornaments in Layer 4C, also made of oyster, are smaller specimens. 2/4C/494 (Fig. 30) is thinner than the previous examples; it has a squared off top with a single hole and tapers to a fairly sharp point. 2/4C/493 is similar; the point has broken off in this case. These are presumably the items described by Golson (1959a:45) as shell copies of the *Charcharodon* shark tooth necklace unit. The broken pendant in Fig. 31, 2/4C/492 features a rounded top with quite a large hole. This could also be a lure shank; it is thick and relatively straight sided; the point would probably have been rounded like that of Fig. 29.



Figs. 23-36. Worked bone and shell. 23-27. Bone tubes. 28. Partially cut bone. 29. Shell lure shank or pendant. 30-31. Shell pendants. 32-33. Bone scrapers/burnishers. 34. Awl. 35. Cut tooth. 36. Cut bone. 26. Layer 4A. 29, 33. Layer 4B. Remainder, Layer 4C.

Two fragments which are possibly ornaments also come from Layer 4C. One is a small tooth, split longitudinally (Fig. 35). There is no sign of any suspension hole. The other is a small rectangular sectioned piece of ivory with a single hole, broken across its diameter, and a flat base (3/4C/492, Fig. 36). It is similar in form to the base of a lure hook point, but its small size suggests that it is more likely to be ornamental.

The ornaments from Opito are generally plain and simple. This assemblage lacks the more elaborate bone and stone reel necklace units common in other Archaic sites, although Duff (1956:103) describes a well finished stone reel with six transverse ridges found at Opito Bay. The two bone reels found at Hot Water Beach, for example, were decorated with three external ridges like those from Wairau, and a stone reel of similar form was also found (Leahy 1974:42). At Hahei an archaic burial yielded two distinctive styles of ivory reels, one barrel shaped with single external ridge, the other with a series of pronounced transverse ridges set close together to produce a concertina like effect (Edson & Brown 1977:32-33).

MISCELLANEOUS WORKED BONE (Figs. 32-34)

A bone point, 9.8 cm long, was found in Layer 4B (5/4B/42). Made from the rib bone of the N.Z. fur seal, the point has been fashioned by cutting facets at an angle on two edges; the other end is broken (Fig. 33). The function of this artefact is uncertain; there is no sign of an eyelet hole to suggest a needle. The perforation of skins is one possibility. A slender bone awl 7 cm long was found in Layer 4C. It is made from bird bone, identified as the right ulna of one of the Charadriiformes. The sharp nib-like point has been made by cutting diagonally across the grain (Fig. 34). Awls of similar form are found in other archaic sites: Wairau Bar (Duff 1956:217), Harataonga Bay (Law 1972:88) and Hot Water Beach (Leahy 1974:45). However, as Duff (1956:217) notes, bone awls and needles are commonly found in sites up to the nineteenth century, so they cannot be regarded as distinctively Archaic. Likewise, Golson (1959a:62) includes awls and needles in his list of culture traits common to both Archaic and Classic phases in New Zealand prehistory.

One other piece of worked bone was recovered from Layer 4C. It is a flat piece of bone 9.4 cm long, with a smooth chisel-like point 1.2 cm wide (Fig. 32). Bone artefacts excavated from the Mt. Camel site in Northland have working surfaces with similar rounded chisel-like profile. Roe (1969:69) interprets these as burnishers used in the preparation of skins for clothing. Law (1972:88) describes a similar artefact found at Harataonga Bay as a bone chisel or possibly a skin burnisher.

ADZES (Figs. 37-56)

According to the preliminary report published on the Opito site, the full range of archaic adzes was present, except for the sidehafted form (Duff Type 5) (Golson 1959a:19). On closer inspection the adzes are mostly roughly finished, and many do not fit with any certainty into one or other of Duff's adze types. Only 29 adzes are finished. Table 6 lists the number of adzes and roughouts found in each layer. The roughouts have been divided into lenticular, quadrangular, triangular and miscellaneous (those not fitting any of these categories), on the basis of cross section. Among the roughouts, those with quadrangular cross section are the most numerous; quadrangular and triangular roughouts together form the bulk of the assemblage. In the discussion which follows the descriptive terms used are those recommended by Davidson (1961:6).

Table 6. Adzes and roughouts.

Layer	Finished adzes	Roughouts lenticular	quadrangular	triangular	misc.	total	Total
3			2			2	2
4A	3		10	5		15	18
4B	9		9	7		16	25
4C	17	2	22	21	8	53	70
	29	2	43	33	8	86	115

In Layer 3 two roughouts were found, both broken. These are quadrangular, and are probably both butt ends. Three finished adzes were recovered from Layer 4A, one complete. 1/4A/56 is a triangular sectioned adze fragment 10.5 cm long, with a maximum width of 5.5 cm. It is broken at both ends, making it difficult to assign to a type category. Judging by the cross section it is either a Duff Type 4, or the rarer Type 3. It is well polished on the back and only partially on the front. The single complete adze is 6/4A/50 (Fig. 38). It is 7.7 cm long and has the thin quadrangular cross section and wide front characteristic of a Duff Type 2A. The only polished area is the back of the blade, and there is steep angled flaking around the sides and the evenly rounded butt. There is no marked tang, another characteristic of a 2A adze (Duff 1956:161). SR/4A/111 is a section of a quadrangular adze, broken at both ends. It is well polished on the back, only partially on the front.

In all, 15 roughouts were recovered from Layer 4A. Of these, 10 are quadrangular, and the 7 complete specimens range in length 6.4-10.3 cm. 1/4A/57 (Fig. 37), 8.5 cm long, has the thin cross section and wide front typical of a Type 2A adze. There is steep angled flaking along both sides and an area of cortex is present. SJ/4A/62 is the blade portion of a quadrangular roughout. Of the five triangular roughouts in Layer 4A, four are complete; they range 5.9-11.3 cm in length. For example, SR/4A/110 (Fig. 39) is a triangular roughout 8.9 cm long. The maximum width is at the butt end; it tapers abruptly from a width of 4.5 cm at the butt to 2.5 cm at the cutting edge. The cortex is present in places.

Nine finished adzes were recovered from Layer 4B. Three of these are Duff Type 2A. One complete specimen is 3/4B/84 (Fig. 45). Small (6.5 cm long), thin from front to back and lacking a tang, it fits Duff's type category well. It is in the process of being reworked, and polishing is limited to the blade, on front and back. 5/4B/166 (Fig. 42) is a larger example, 9.1 cm long, also in the process of being reworked. It is well polished on front and back, particularly at the blade, and partially on the sides. The third adze is particularly small and thin. It is 5 cm long and 1 cm thick and well polished on front and sides; the blade has broken off.

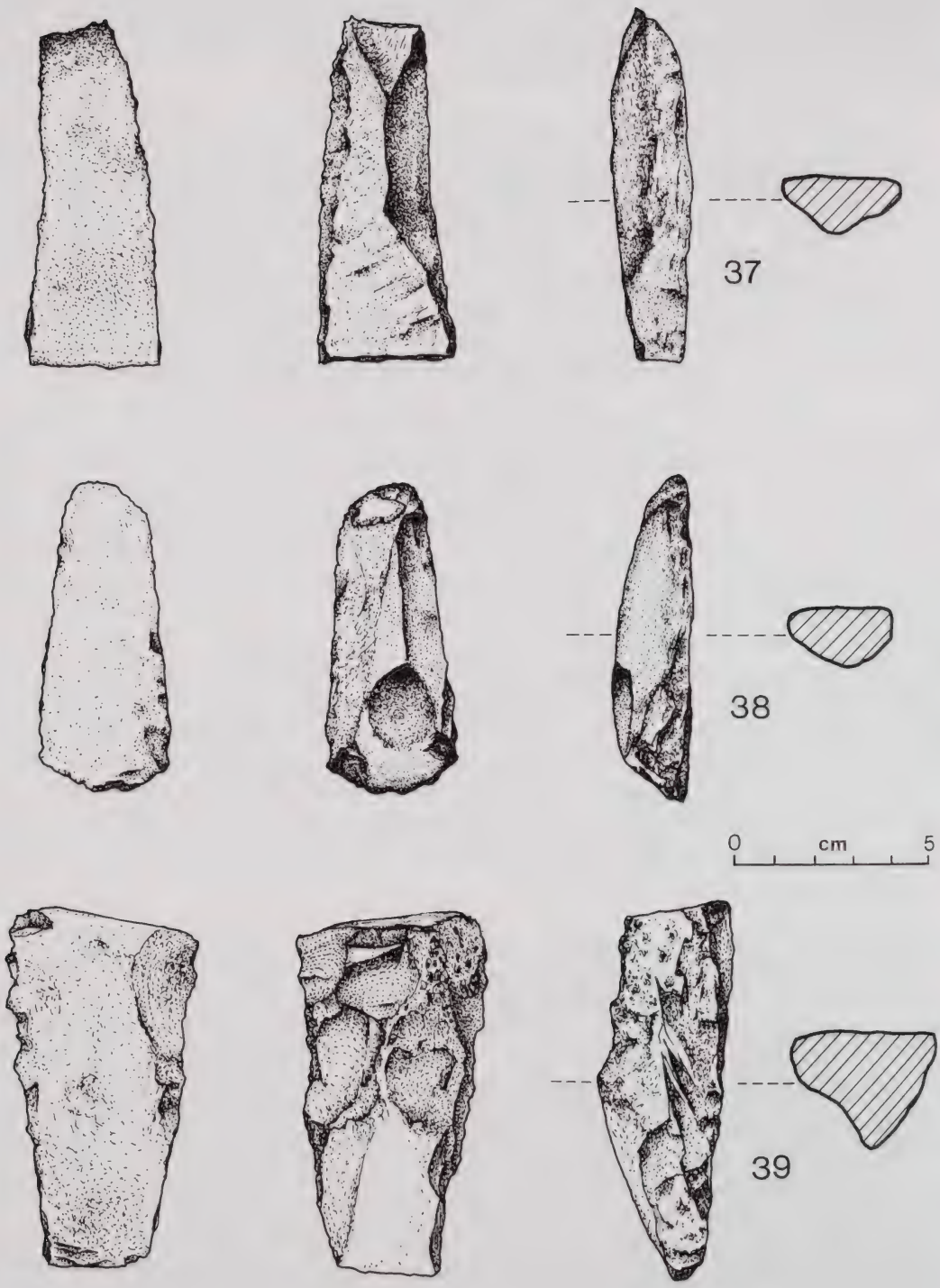
Three other finished adzes of quadrangular cross section come from Layer 4B. S/LM/7/5 is a complete example, 7.7 cm long. It has little butt modification; it could be a Type 1A or 2A. The only traces of polishing are along the cutting edge, and there are areas of cortex on the back. S/LM/7/28 (Fig. 56) is the blade end of a quadrangular adze, possibly a 1A, in the process of being reworked. It is partially polished all over. Flakes

have been removed from the back of the blade to produce a gouge like cutting edge. S/LM/7/7 is also a blade fragment, probably of a 1A adze, ground on the back only. The other four adzes from Layer 4B have triangular cross sections. 4/4B/216 (Fig. 40) is similar to a Duff Type 4A with its high triangular cross section and marked tang. It is partially polished on sides and back; the blade has broken off. 6/4B/66 and 6/4B/68 are broken sections of triangular adzes, Duff Type 3 or Type 4.

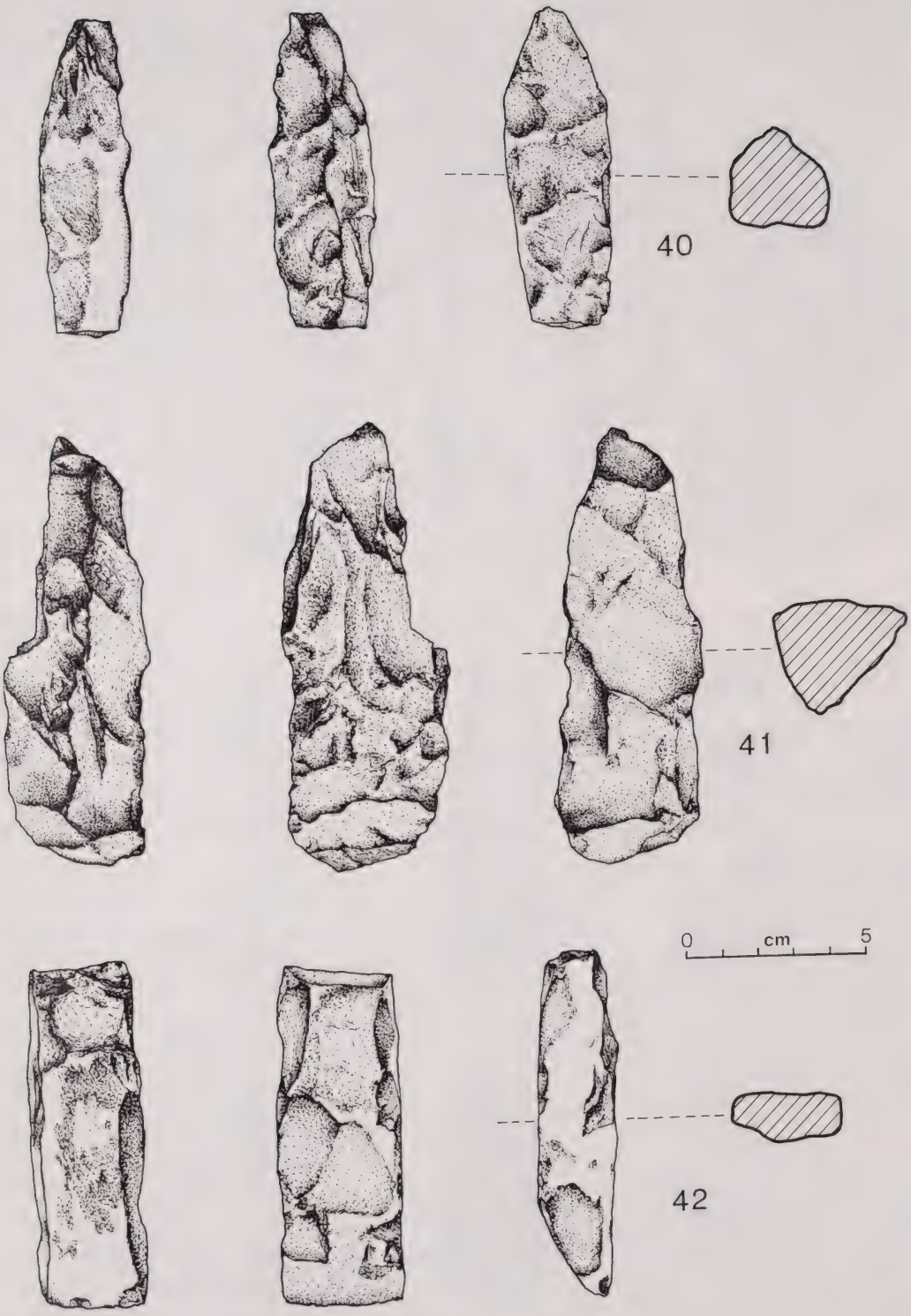
A total of 16 roughouts and roughout fragments were found in Layer 4B, 7 triangular and 9 quadrangular. Four of the quadrangular roughouts are complete: they range in length 9.4-26.8 cm. 1/4B/54 (Fig. 46) is a particularly massive example, 26.8 cm long and a maximum of 9.4 cm wide. It is of classic Duff Type 1A form, with high quadrangular cross section and relatively broad blade (Duff 1956:Pl. 27). Two other quadrangular roughouts, 2/4B/210 and SR/4B/103 also have features of 1A adzes; one of these is broken. Two of the remaining three quadrangular roughouts are probably blade portions. Only one of the triangular roughouts is complete. This is 2/4B/211 (Fig. 41), 11.9 cm long. It has a relatively curved profile and marked tang, similar to a Type 4A adze.

Layer 4C yielded the largest number of adzes and roughouts. A total of 17 finished adzes were recovered, 14 quadrangular and 2 triangular cross sectioned. Of the quadrangular adzes, four could be classified as Type 1A and six as Type 2A. 2/4C/376 and 5/4C/355 (Figs. 50, 51) are two well finished examples of 2A adzes. They measure 11.5 and 8.1 cm in length respectively. The front surfaces are completely polished, the sides and backs partially. 3/4C/269 is a small 2A adze, only partially finished, 6.2 cm long. The front is ground to a flat surface, the sides partially ground. The blade is unground, and the back still has areas of cortex present. 4/4C/675 (Fig. 44) is a typical 2A specimen with wide front and little butt modification. The only traces of polishing are along the cutting edge. 3/4C/262 (Fig. 48) has features of both 1A and 2A adzes. It has the thin quadrangular cross section and wide front of a type 2A adze, and a marked tang, typical of a 1A adze. The back and sides have been reduced by steep angled flaking along the edges. Another well finished 2A adze, 12 cm long, is shown in Fig. 47 (S/LU/7A/1). It is polished on all surfaces, and there is some butt modification. It was in the process of being reworked, particularly the blade, and several large flakes have been removed from the sides.

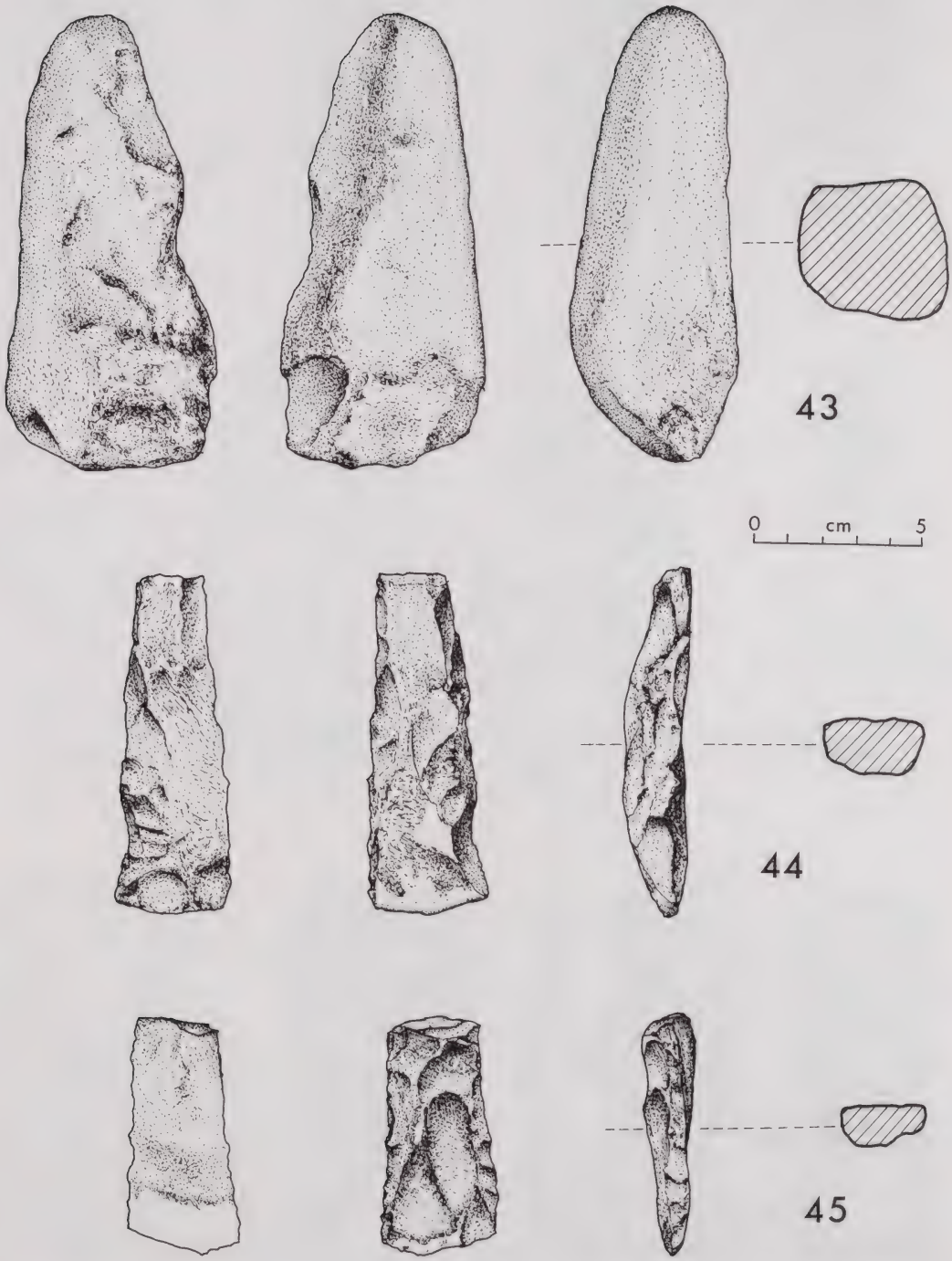
Of the other quadrangular sectioned adzes, four could be classified as Type 1A on the basis of their greater thickness from front to back, and sharper angle between butt and blade (Duff 1956:151). 3/4C/266 is 9.6 cm long; it is well polished on front and back, particularly at the blade, and on one side only. It was being reworked, and has the appearance of being split longitudinally. 3/4C/276 is a complete example, 10.1 cm long, partially polished all over. 3/4C/677 is the broken blade portion of a thick quadrangular sectioned adze, probably a 1A, polished on all surfaces. 4/4C/687 is a similar blade fragment, with partial grinding all over. There are two other blade fragments from this layer, which could be Type 1A or 2A. Both have relatively wide fronts, and steep angled flaking along both sides on the back to form almost a trapezoidal cross section. S/R/4C/129 (Fig. 52) has also been reworked. The angle between sides and back has been reduced by flaking at a shallow angle along both sides, and the front has also had a series of flakes removed along one side to form almost a lenticular cross section. Several deep flakes have been removed from the back of the adze at the blade to form a gouge like cutting edge similar to the example from Layer 4B discussed above.



Figs. 37-39. 37, 39. Roughouts. 38. Adze. All Layer 4A.



Figs. 40-42. 40, 42. Adzes. 41. Roughout. All Layer 4B.



Figs. 43-45. 43. Roughout. 44, 45. Adzes. 43, 44. Layer 4C. 45. Layer 4B.

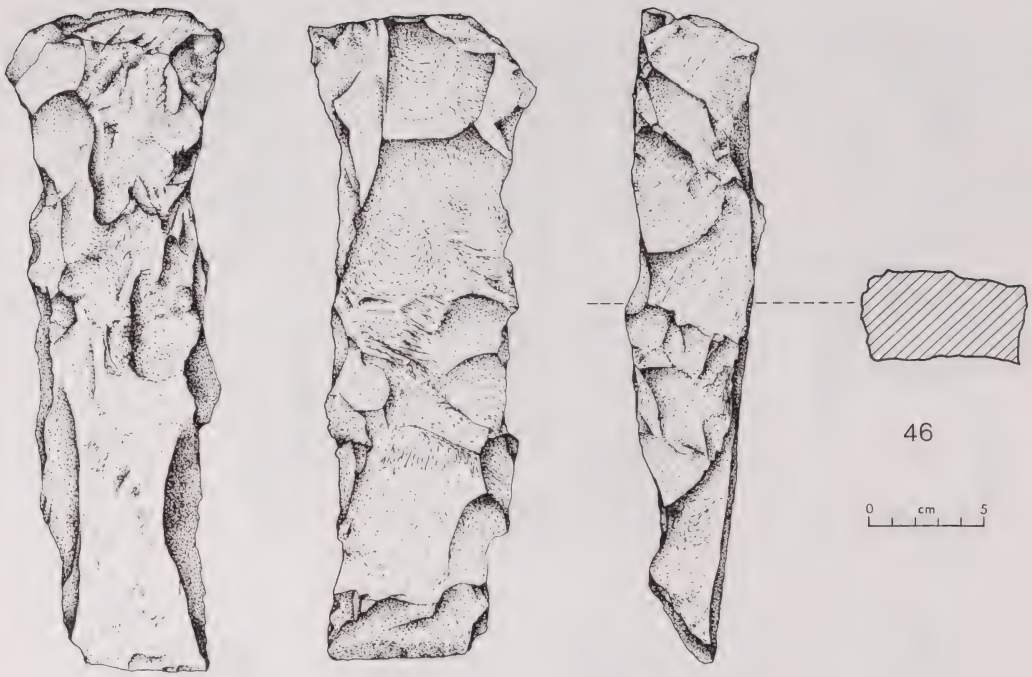


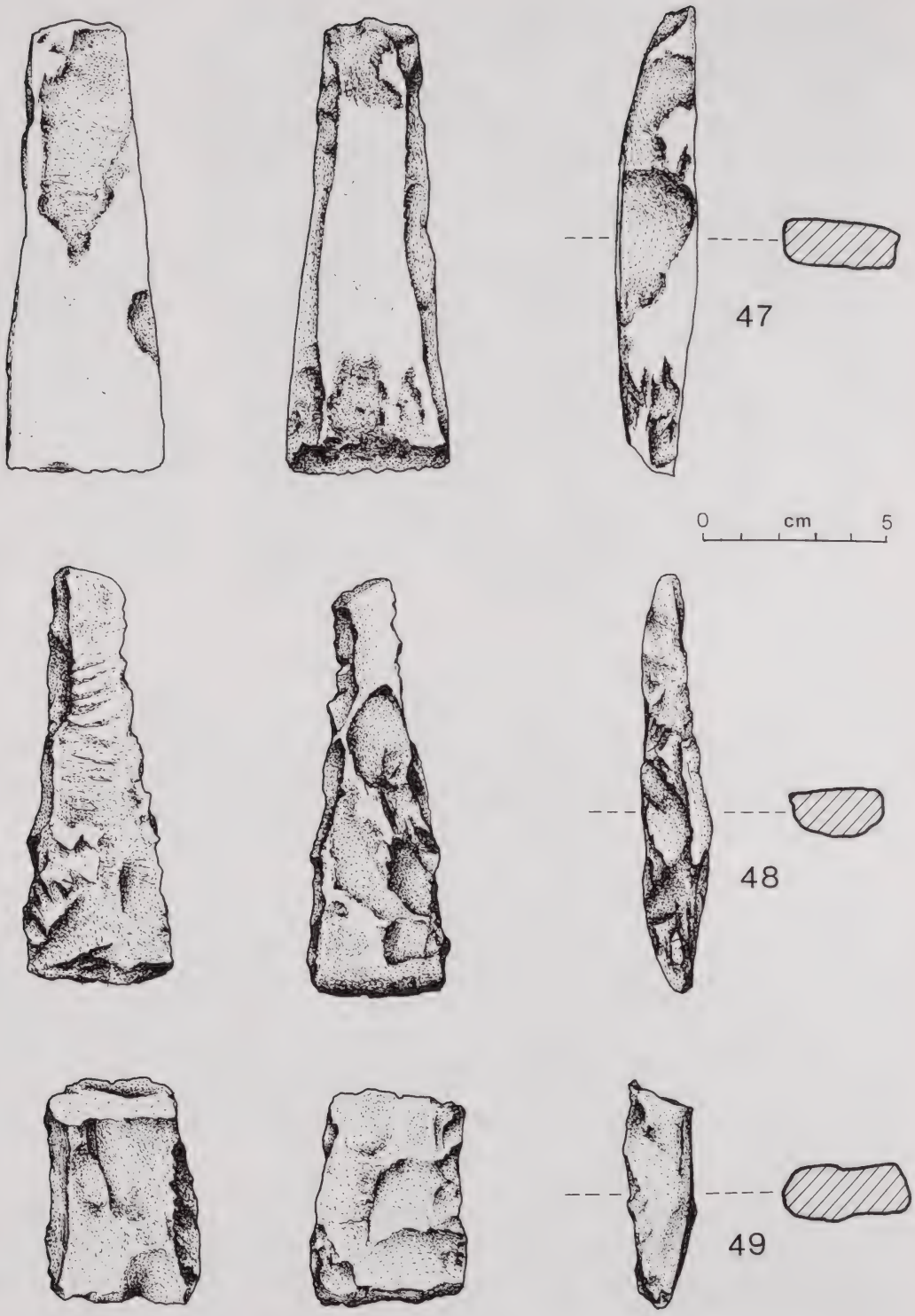
Fig. 46. Large adze roughout, Layer 4B.

Two finished adzes with triangular cross sections were found in Layer 4C. 4/4C/676 is a partially polished example, 11.3 cm long (Fig. 55). It is probably Type 4; since the butt is broken, the form of the tang is uncertain. 4/4C/688 is a narrower form, ground only at the tip of the blade. It is similar to a Type 3A, but again it is broken at the butt.

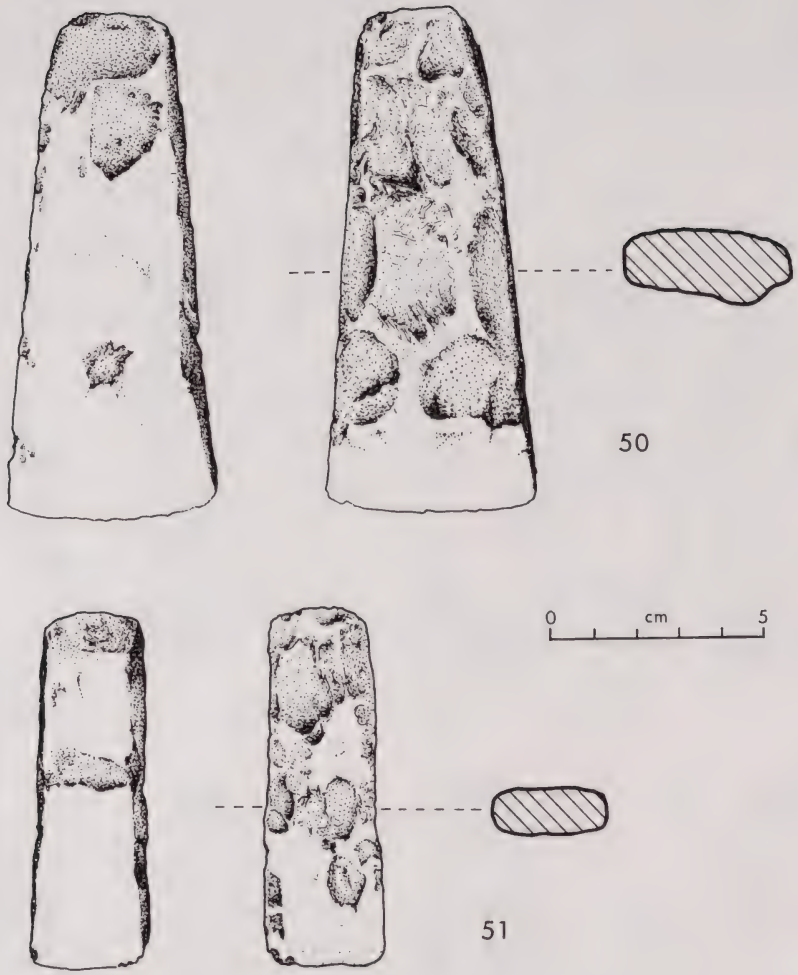
Altogether 53 roughout adzes were recovered in Layer 4C, 22 quadrangular, 21 triangular and 2 lenticular. Of the quadrangular roughouts 14 were complete; they are 6.5-12.6 cm in length. The 14 complete triangular roughouts range in length 7.5-12 cm. Included in the miscellaneous category were 7 roughouts of indeterminate cross section, and one complete specimen, 12.5 cm long, which is only possibly an adze roughout, 3/4C/255. It has an asymmetrical cross section, and is manufactured from a distinctive material unlike that of other adzes and roughouts, possibly greywacke (Fig. 43). Traces of cortex remain over most of the surface. One of the other roughout fragments in the miscellaneous category is also made of this material. Only one of the lenticular roughouts is complete; it is 7.5 cm long.

In Layer 4B was found a roughout of a small narrow chisel, 6.5 cm long and 1.8 cm wide (S/LM/6/16). The blade has not been ground, and steep angled flakes have been struck off each side to form a high quadrangular cross section (Fig. 54). There are traces of grinding on the back.

The great majority of adzes in this assemblage are manufactured from basalt, the most obvious source being the major quarry site of Tahanga (N40/8), less than 2.5 km distant from the Opito site. Tahanga is at present the only source of fine grained basalt



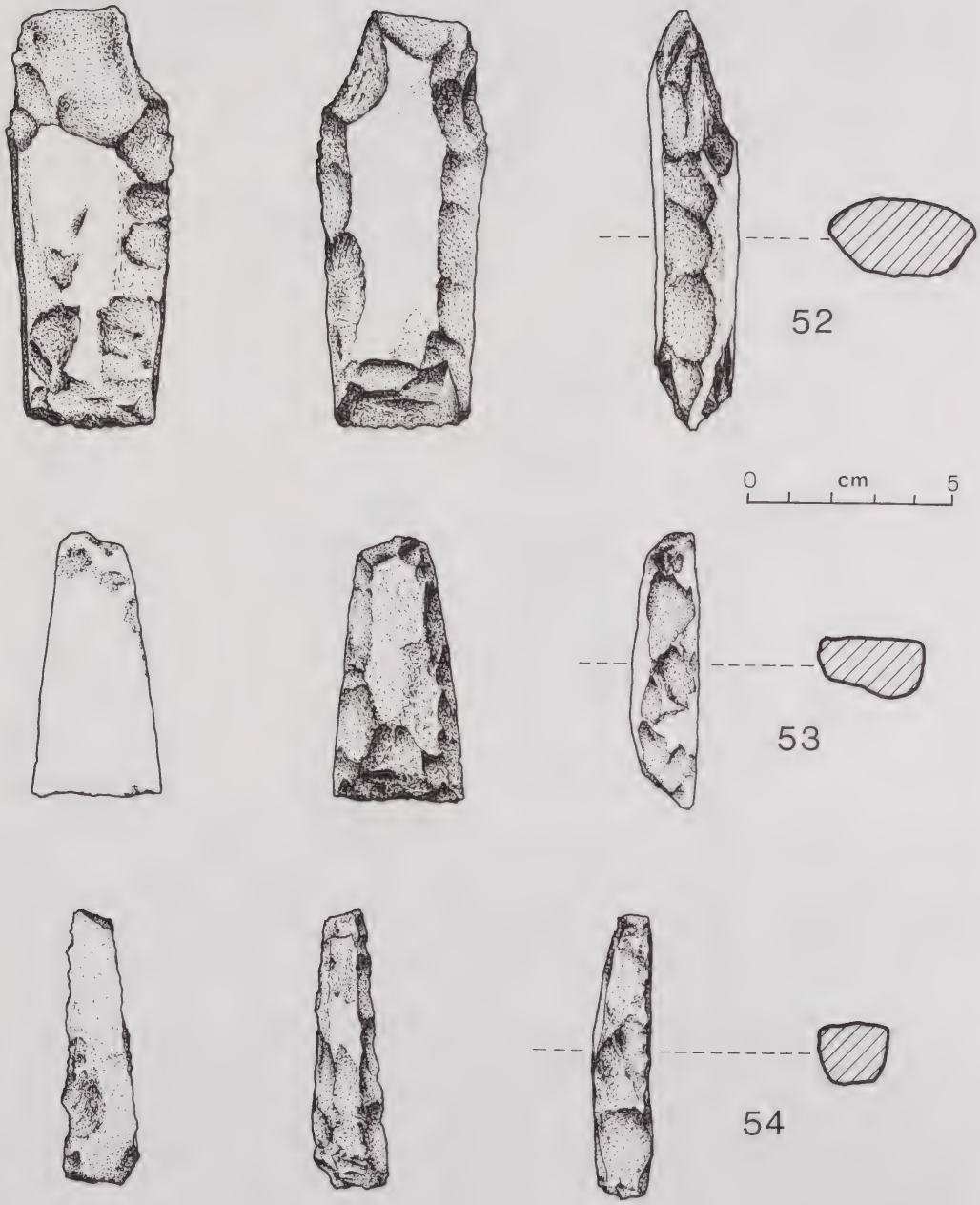
Figs. 47-49. 47, 48. Adzes, Layer 4C. 49. Roughout, Layer 4B.



Figs. 50, 51. Adzes, Layer 4C.

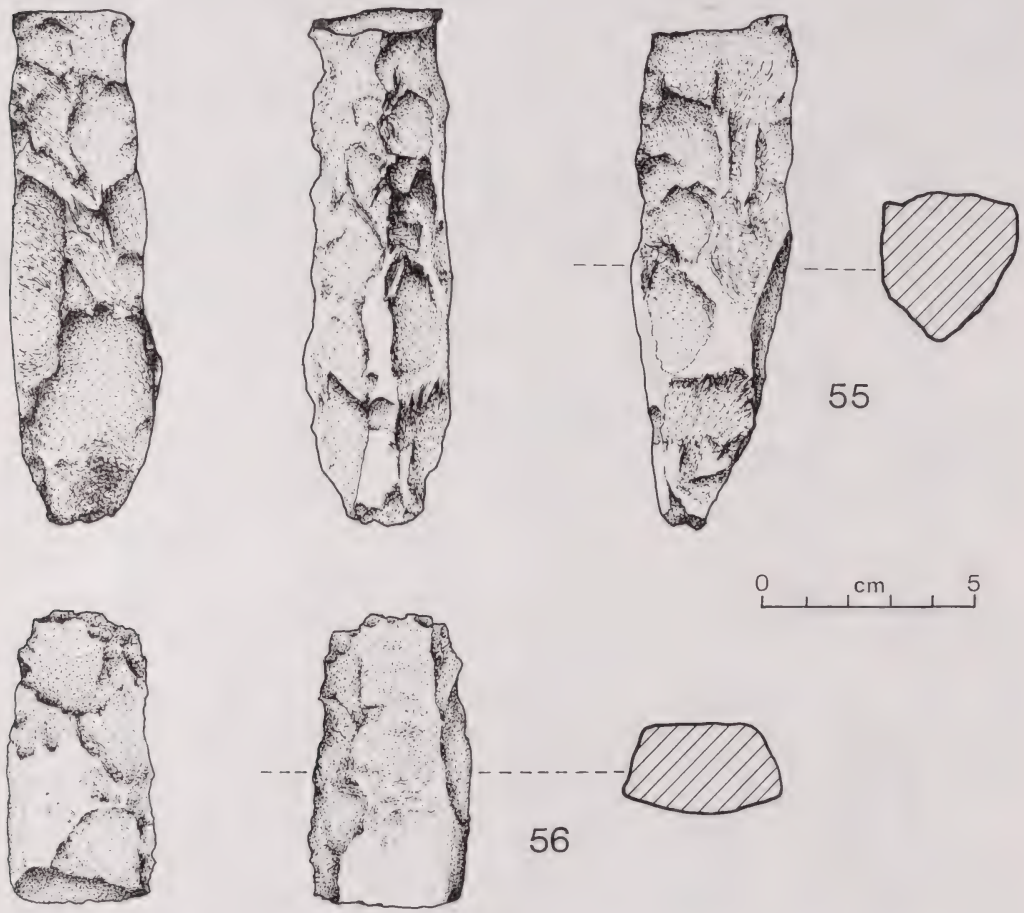
known to have been used extensively in the manufacture of adzes. Green (1963:64) considers it to have been the source of 'most of the material for archaic adzes on the Coromandel coast'. There are widespread basaltic deposits in Northland, but the distribution study of basalt flakes and adzes made by Moore suggests that any such additional sources would have been of only local significance (Moore 1975:34).

A number of roughouts and some of the finished adzes still have areas of cortex present, representing the original breakage plane of the rock, subsequently weathered (S. Best, pers. comm.). Altogether 23 adzes and roughouts have traces of cortex, 6 in Layer 4A, 3 in Layer 4B and 12 in Layer 4C. Two of the possible roughout fragments from Layer 4C, included in the miscellaneous category, are interesting in that they have glossy surfaces indicative of sand blasting. They have thus been exposed on the surface for a considerable period. 4/4C/690 has signs of use polish on one edge, producing two slightly concave areas of wear. It may have been used as an abrader on relatively soft material such as bone or wood.



Figs. 52-54. 52, 53. Adzes, Layer 4C. 54. Chisel, Layer 4B.

Three of the finished adzes, one from Layer 4B and two from Layer 4C, are manufactured from a fine grained greywacke (S. Best, pers. comm.). The two examples from Layer 4C, 2/4C/376 and 5/4C/355 (Figs. 50, 51) are a dark green-grey, and the one from Layer 4B, S/LM/7/28 (Fig. 56) is a dark grey. The two adzes from Layer 4C are particularly well polished.



Figs. 55, 56. 55. Adze, Layer 4C. 56. Adze, Layer 4B.

An important feature of the Opito adze assemblage is their small size. The finished adzes average 9.2 cm in length, and they range only 6.2-12.0 cm. The roughouts are slightly larger on average with a mean length of 9.7 cm. The range is somewhat larger than that of the finished adzes, 6.4-26.8 cm. Even among the roughouts, however, there are only three examples over 13 cm long. The small size of the Opito adzes is all the more striking when compared with the average sizes of other Archaic adze assemblages. The adzes from Wairau Bar, for example, range 7-48 cm in length. Simmons (1973), in his study of South Island material culture, provides a useful figure illustrating the range and median length of adze caches from a large number of Archaic and later sites.

FILES AND ABRADERS (Figs. 57-64)

Altogether 25 stone files and file fragments were recovered. One broken file, 5.6 cm long with rectangular cross section was found in Layer 3. From Layer 4A came 5 broken files, ranging in length 8.5-3.3 cm, and two small file fragments. All have lenticular cross sections. The tips have broken off all but one of the files, 1/4A/159 (Fig. 63). They all show wear along the long edges. S/J/4A/164 (Fig. 64) tapers abruptly towards the point from near the break. 1/4A/60 is the tip of a lenticular file, worn at an angle to form a triangular shaped point (Fig. 60).

Figs. 57-67. Files and worked pumice. 57-64. Files and file fragments. 65-67. Worked pumice. 60, 63, 64, 66. Layer 4A. Remainder, Layer 4C.

In Layer 4B was found a broken file, 5.8 cm long, with intact tip. It is worn along one edge to form almost a rectangular cross section. Three file fragments were found, two with evenly rounded tips. This layer also contained an oval sectioned piece of sandstone 5.2 cm long, which could be a file roughout.

Layer 4C contained 15 files and file fragments, 11 with lenticular cross section. Of these, 3 are almost complete files with broken tips, ranging in length 6.5-5.3 cm. Five are broken off file tips. Four of these are relatively flat and evenly rounded, for example 6/4C/165 (Fig. 62). The fifth, 6/4C/155, tapers to a sharp point (Fig. 61). Two fragments have a triangular cross section; they fit together to form the midsection of a triangular sectioned file 7.1 cm long. The final two fragments from Layer 4C have rectangular cross sections. 3/4C/249, 9.5 cm long is worn along one long edge to form almost a polyhedral cross section. Three file roughouts were also found in this layer, and an abrader made from a flat rectangular piece of coarse pumice. It is 8.7 cm long, and has worn concave surfaces on both flat sides. One other pumice abrader made from a flat oval shaped pebble 10.3 cm long was also found in Layer 4C. It fits comfortably in the hand, and has a concave working surface on one side.

HAMMERSTONES AND GRINDSTONES

A grindstone made from a flat oval waterworn stone 15 cm long was found in Layer 3. The concave working surface on one side has longitudinal score marks. A round pebble with traces of ochre, presumably used for grinding, also came from this layer. In Layer 4A were found two round stones, probably both used as grindstones, although only one has traces of ochre.

In Layer 4B were found two more grindstones, both round pebbles with traces of ochre. A larger round stone with bruising consistent with use as a hammerstone also came from this layer. Layer 4B contained a large oval waterworn stone split in two longitudinally, with no evidence of further use or working. The 7 cracked stones recovered from this layer are *haangi* stones. Layer 4C contained 6 round stones with evidence of use. Two are smoothly worn consistent with their being used as grindstones; the other four, which have some bruising, were probably used as hammerstones.

WORKED PUMICE (Figs. 65-67)

Although pumice occurred in quantity throughout the site, little appears to have been used. Apart from the two abraders mentioned above, only four pieces of worked pumice were found, one in Layer 4A and three in Layer 4C. 8/4A/43, from Layer 4A, is a flat triangular shaped piece of pumice with rounded rectangular cross section (Fig. 66). It is smoothly worn and may have been used as an abrader of some description.

The function of two cone shaped pieces of pumice from Layer 4C is uncertain. Both have flat tops and rounded points; one is 5.2 cm long and 3.7 cm in diameter across the top (Fig. 65), the other 4.1 cm long and 3.7 cm in diameter. The larger example has two short transverse grooves around the circumference. Artefacts of similar form have been found in many sites in New Zealand. Trotter (1975:203) in his discussion of an example from Redcliffs in Canterbury suggests that they were possibly stoppers for gourds or similar containers. The third piece of pumice, 3/4C/294 is a flat triangular shape, 4.9 cm long. It has a shallow hole on each side, 1 cm and 0.8 cm in diameter, possibly made by the smoothing off of bone or wooden points (Fig. 67).

STONE POINTS (Figs. 68, 69)

A total of 139 stone points were found. All are made from siliceous material, such as chert, jasper and quartz. The two basic methods of working a flake to a point by flaking either edge from one face only, or from different faces were both used, as at Harataonga Bay (Law 1972:92-93).

The drill points from Opito were initially divided into three groups, complete, broken and unfinished. The complete and broken groups were then subdivided into those with triangular and those with rectangular cross sections. Table 7 lists the numbers and distribution of drill points in each of these categories, and the sizes of the broken and complete points in each layer.

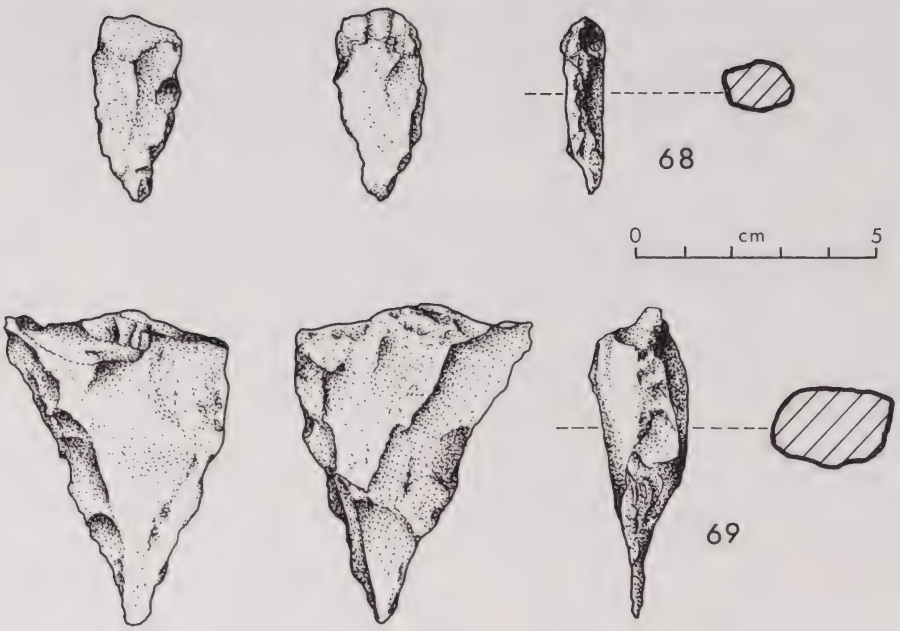
Table 7. Numbers and lengths of stone drill points

Layer	3	4A	4B	4C	Total
Triangular complete	1	6	10	15	
broken	1	1	6	7	47
Rectangular complete	1	9	10	23	
broken		8	12	11	74
Unfinished	1	4	8	5	18
Total	4	28	46	61	139
Length (cm) maximum	3.8	6.8	7.4	6.2	
minimum	2.6	1.9	2.1	1.8	
mean	3.2	3.4	3.7	3.5	

The majority of drill points come from Layers 4A to 4C. The finished points are 1.8-7.4 cm in length (for example, Figs. 68, 69). The mean lengths, however, do not vary greatly between layers; the range over Layers 4A to 4C is only 0.3 cm. Rectangular cross sectioned points are the most common; of the 121 finished points recovered, 74 are rectangular. This is the reverse of the situation at Hot Water Beach, where triangular sectioned points considerably outnumbered rectangular in all layers. Leahy (1974:50) observes that in most cases triangular points require considerably more flaking and finishing than rectangular ones. This could be a factor in the predominance of rectangular points at Opito. In the case of Hot Water Beach, however, Leahy postulates that the triangular points might be more important or efficient, while the rectangular ones may have been used for a special purpose.

STONE FLAKES

The large number of flakes recovered were divided into basalt, siliceous and obsidian for analysis. These categories were further divided into 'used' (flakes with evidence of use wear) and 'waste' (flakes without such evidence). An additional category of flakes, crosscutting the division according to material, was present. This comprised flakes with evidence of polishing, grinding or hammerdressing, waste material from the reworking of finished adxes or the final stages of adze manufacture. The flake material was not sieved during excavation; thus the extent of the bias in the sample recovered, particularly with



Figs. 68, 69. Drill points, Layer 4C.

regard to size, cannot be determined. Therefore no detailed statistical analysis was undertaken. The flake material was simply treated by layer in terms of total weight and number of pieces in each category.

Adze Flakes

Altogether 49 adze flakes were recovered, the majority from Layers 4B and 4C. They range in length 1.3-7.2 cm, and all are polished on one or two surfaces except for one hammerdressed flake from Layer 4C. Seven flakes are polished on two surfaces, suggesting that they come from the edges of adzes. On one flake, from Layer 4A, the polished surfaces meet at an acute angle; it appears to have come from the blade portion of a quadrangular sectioned adze. The remainder of the flakes are more obtuse angled. Table 8 lists the number and weight of adze flakes found in each layer.

Table 8. Number and weight of adze flakes.

Layer	Number	Weight (g)
3	1	4.6
4A	9	42.0
4B	20	52.0
4C	19	114.8
	49	213.4

It is interesting to note that the adze flakes comprise a variety of material considerably greater than the adzes and roughouts. Only 15 of the 49 flakes are Tahanga basalt; the remainder are varieties of argillite (S. Best, pers. comm.). The argillites range in colour from pale grey-green (16 flakes) and dark grey-green (7 flakes) to grey (5 flakes) and black (1 flake). One or two of the darker specimens may be fine grained Tahanga basalt.

Of the pale grey-green flakes, 12 came from Layer 4B, and 11 of these from Square 5. The remainder came from Layer 4C. It is probable that these flakes, at least those from Layer 4B, originate from the reworking of a single adze, subsequently removed from the site. Two pale grey-green flakes similar to those discussed above, but with distinctive black veining were found, one in Layer 4A and one in Layer 4C. This type of argillite is characteristic of the Nelson-D'Urville Island region, and adzes from this source have been collected all over New Zealand (Walls 1974:37).

The variety of argillites among the adze flakes, some probably from sources as far away as D'Urville Island, suggests that adzes manufactured from this material were brought to the site in finished form, reworked, and subsequently used elsewhere. This interpretation is supported by the fact that no finished argillite adzes or roughouts were found. Only three of the finished adzes are not manufactured from Tahanga basalt, and these have been identified as being fine grained greywacke (S. Best, pers. comm.).

Basalt Flakes

In view of the proximity of the Tahanga basalt quarry and the predominance of Tahanga material among the adzes and roughouts, it is likely that the basalt flake material also comes from this source. A total of 267 basalt flakes were recovered; only 16 of these showed any sign of use. Table 9 gives the number and weight of flakes recovered from each layer. The greatest quantity of material came from Layers 4A to 4C, in particular Layer 4C.

Table 9. Number and weight of basalt flakes.

Layer	Used	Waste	Total	Weight (g)
3	1	2	3	18.8
4A	2	47	49	583.3
4B	8	73	81	1514.1
4C	5	129	134	1818.2
Total	16	251	267	3934.4

Siliceous Material

A large amount of siliceous material, both flakes and cores, was recovered from Opito, mainly in the form of siliceous sinter, with some chalcedony. There is a large deposit of siliceous sinter less than 1 km from the site. Thus it is probable that the majority of the siliceous material comes from this source (S. Best, pers. comm). Table 10 gives the number and total weight of siliceous flakes (excluding cores) in each layer.

Table 10. Number and weight of siliceous flakes and cores.

Layer	Used	Waste	Total	Weight (g)	Cores
3		21	21	160.2	
4A	12	95	107	830.7	8
4B	10	175	185	1224.3	24
4C	15	335	350	2270.0	15
	37	626	663	4485.2	47

A total of 663 siliceous flakes were recovered, over twice the number of basalt flakes. The difference in terms of total weight is not nearly so great, the siliceous flakes tend to be much smaller. Paralleling the distribution of basalt flakes, Layer 4C contained the greatest quantity of material, both in terms of number of flakes and total weight. Layer 4B contained the largest number of cores. Altogether 37 siliceous flakes showed signs of use wear, a similar proportion to the basalt flakes.

Obsidian

The obsidian was divided into two categories on the basis of colour; green, most probably from the Mayor Island source, and grey, from 'other sources'. In all 86 pieces of obsidian were recovered, 78 flakes and 7 cores. The flakes were then divided into 'used' and 'waste' categories; none of the cores showed any sign of use. Table 11 lists the numbers and weight of obsidian material in each of these categories found in each layer.

Table 11. Number and weight of obsidian flakes and cores.

Layer	Mayor Island						Total		Other sources	
	waste		used		cores					
	no.	wt.(g)	no.	wt.(g)	no.	wt.(g)	no.	wt(g)	no.	wt.(g)
3	2						2	5.5		
4A	15	47.1	5	127.9			20	175.0		
4B	10	106.9	4	37.3			14	144.2		
4C	34	184.0	8	173.5	7	755.7	49	1113.2	1	21.2
	61		17		7		85	1437.9		

All the obsidian was green, except for one waste grey flake from Layer 4B. Of the 78 green flakes recovered, only 17 showed signs of use. Layer 4C again contained the greatest amount of material, both in terms of number of pieces and total weight. Of the 7 cores recovered, 6 came from Layer 4C. The total weight of obsidian from Opito, and the total number of pieces, is considerably less than either the siliceous material or basalt.

The hypothesis that Mayor Island was the first obsidian source to be exploited in the early period of Polynesian settlement in New Zealand, and that over time the proportion of obsidian from Mayor Island decreased as other sources were discovered was first put forward by Green (1964), and is widely accepted. However, recent research by Leach &

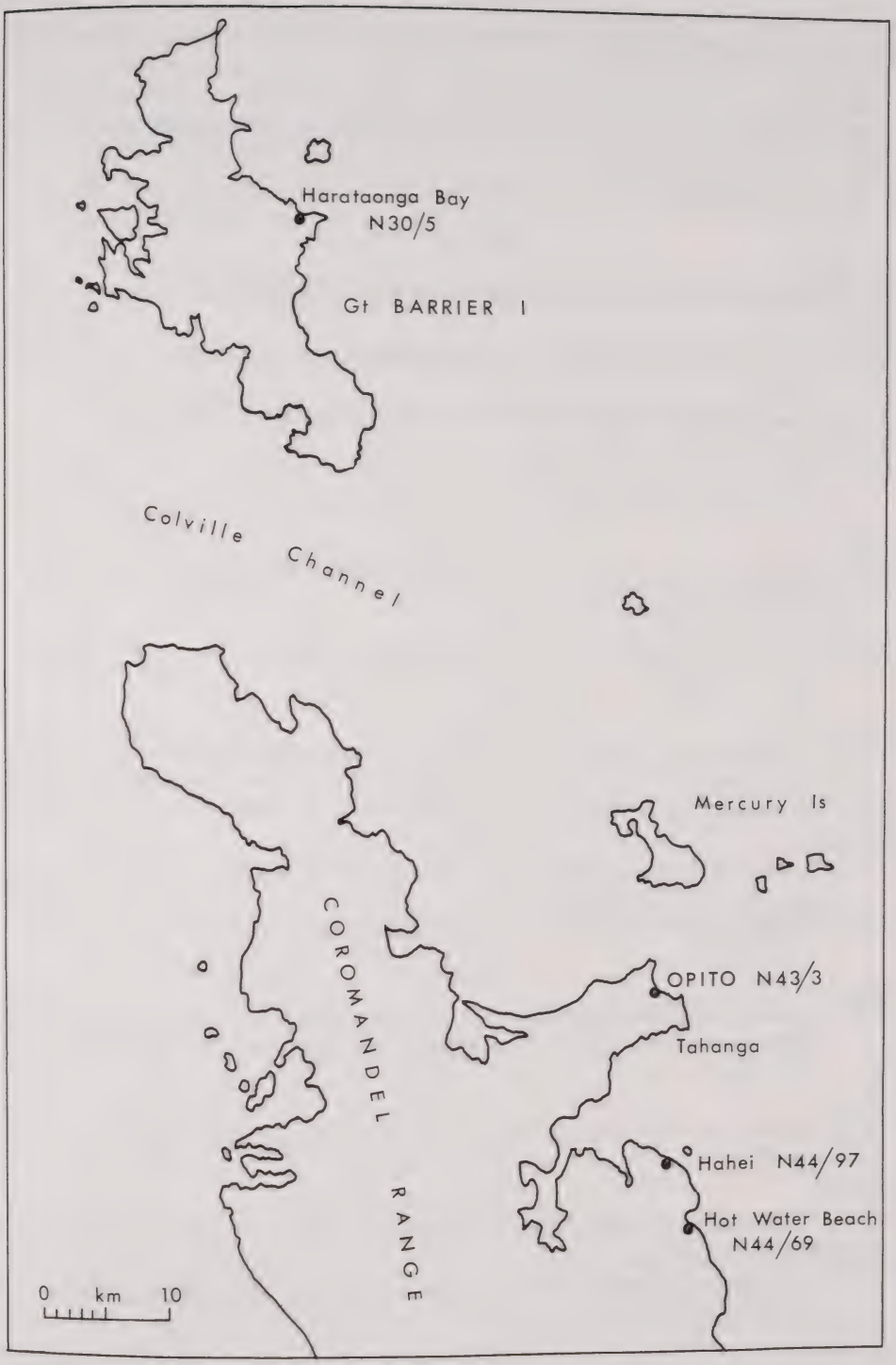
De Souza (1979) throws some doubt on the validity of this theory. The evidence from the earliest known sites suggests extensive geological knowledge by the 12th century A.D. While Mayor Island was clearly the most important source of obsidian for most groups of people throughout New Zealand prehistory (Leach & De Souza 1979:44), it is becoming apparent as more data comes available and sourcing techniques are perfected, that the proportion of Mayor Island obsidian in a site is not a useful guide to its age.

There is indeed a high proportion of obsidian likely to be from Mayor Island in the Opito site. A detrital source of flake quality obsidian occurs near Whitianga, some 20 km away, yet does not appear to have been exploited to any great extent. Green (1964:140) states that this is probably a source of many of the non-Mayor Island obsidian flakes in early sites on the Coromandel coast. The pattern evident in the Opito site parallels that in other early sites in the area. There is a predominance of Mayor Island obsidian in the Harataonga Bay site, for example, despite the presence of an alternative source at Te Ahumata on Great Barrier itself, only 10 km away.

CONCLUSIONS

The material culture of the Opito site is unequivocally Archaic in character, in accord with the early radiocarbon date obtained. This is quoted as 640 ± 50 years B.P. by Green (1963:60). The one piece fish-hooks, and adzes, for example are essentially similar to those varieties well known from the South Island Archaic. The ornaments in bone and shell are also directly comparable with specimens from the major South Island Archaic sites of Wairau Bar and Shag River (Duff: 1956). The dentalium shell and cut bone tubes and other necklace units are all plain. None of the more elaborate Archaic ornaments known from the North Island, such as chevroned amulets, ridged bone reels and whale tooth pendants (Golson 1959a:44) were found in the Opito site.

The standard cultural sequence from Archaic to Classic Maori culture defined by Golson (1959a) is based on material culture. Changes in economy and social structure have not been correlated with this sequence on a New Zealand wide basis with any success. Indeed, as Davidson (1978:1) notes, it is becoming evident that attention should be directed towards regional sequences. On a regional level there is increasing evidence for a distinct regional adaptation centred on the east coast of the Coromandel Peninsula in the early period of Polynesian settlement. On the basis of material culture at least, the Opito site (Fig. 70) forms part of a homogeneous and well established cultural tradition in the Coromandel area. The overall features of the assemblage are readily comparable with the published results from other early sites in the region, notably Hot Water Beach (site N44/69) and Harataonga Bay (site N30/5). Analysis of the material from Hot Water Beach and Opito shows considerable similarities between the two sites. In both there is extensive use of moa bone as raw material, particularly for the manufacture of fish-hooks, and evidence for decreasing supplies of moa bone in later levels. As the evidence of fishing gear suggests, there is an emphasis on line fishing, and there is also a predominance of Mayor Island obsidian in both sites.



Figs. 70. Map of Coromandel Peninsula showing major Archaic sites in the region referred to in text. Drawn by C. Phillips.

Acknowledgements. I am most grateful to Janet Davidson for the opportunity to work on the Opito assemblage, and especially for all the advice and editorial assistance she has given throughout the writing of this manuscript. My thanks go to Jan Morrison of Auckland University for preparing the illustrations, and to Caroline Phillips of Auckland University for her assistance in preparing this manuscript for publication. Richard Cassels of Auckland University identified some of the bone material and Simon Best of Auckland University provided useful information on the stone material. My thanks also go to Sandra Othams of Auckland Museum for typing the manuscript.

REFERENCES

CROSBY, E.B.
1966 Maori fishing gear. Unpublished M.A. Thesis, University of Auckland.

DAVIDSON, J.M.
1961 A guide to the description of adzes (introduction). *N.Z. Archaeol. Ass. Newsl.* 4 (3): 6-10.
1978 Auckland prehistory: a review. *Rec. Auckland Inst. Mus.* 15: 1-14.

DAVIDSON, J.M., and R.C. GREEN
1975 A locality map for Skipper's Ridge (N40/7), Opito. *Rec. Auckland Inst. Mus.* 12: 43-46.

DUFF, R.
1956 *The Moa-hunter Period of Maori Culture*. 2nd edition. Government Printer, Wellington. 400p.

EDSON, S., and D. BROWN
1977 Salvage excavation of an Archaic burial context, N44/97, Hahei. *Rec. Auckland Inst. Mus.* 14: 25-36.

GOLSON, J.
1959a Culture change in prehistoric New Zealand. *In* J.D. Freeman and W.R. Geddes (Eds.), *Anthropology in the South seas . . .* Thomas Avery, New Plymouth. 267p. pp. 29-74.
1959b Excavations on the Coromandel Peninsula. *N.Z. Archaeol. Ass. Newsl.* 2 (2): 13-18.

GREEN, R.C.
1963 Summaries of sites at Opito, Sarah's Gully and Great Mercury Island. *N.Z. Archaeol. Ass. Newsl.* 6 (1): 57-69.
1964 Sources, ages and exploitation of New Zealand obsidian. *N.Z. Archaeol. Ass. Newsl.* 7 (3): 134-143.

GROUBE, L.M.
1968 Research in New Zealand prehistory since 1956. *In* I. Yawata and Y.H. Sinoto (Editors), *Prehistoric Culture in Oceania*. Bishop Museum Press, Honolulu. 179p. pp. 141-149.

LAW, R.G.
1972 Archaeology at Harataonga Bay, Great Barrier Island. *Rec. Auckland Inst. Mus.* 9: 81-123.

LEACH, B.F.
1977 Dentalium shell in New Zealand archaeological sites. *J. R. Soc. N.Z.* 7 (4): 473-483.

LEACH, B.F. and P. DE SOUZA
1979 The changing proportions of Mayor Island obsidian in New Zealand prehistory. *N.Z. J. Archaeol.* 1: 29-51.

LEAHY, A.
1974 Excavations at Hot Water Beach (N44/69). *Rec. Auckland Inst. Mus.* 11: 23-36.

MOORE, P.R.
1975 Preliminary investigation of the Tahanga Basalt, Coromandel Peninsula. *N.Z. Archaeol. Ass. Newsl.* 18 (1): 32-36.

NICHOLLS, M.
1963 A preliminary report of excavations on Ponui Island. *N.Z. Archaeol. Ass. Newsl.* 6 (1): 19-24.

ORCHISTON, D.W.
1972 Maori neck and ear ornaments of the 1770's. *J. R. Soc. N.Z.* 2 (1): 91-107.

ROE, N.
1969 An archaeological assemblage from Houhora, Northland. Unpublished M.A. thesis, University of Auckland.

SIMMONS, D.R.
1973 Suggested periods in South Island prehistory. *Rec. Auckland Inst. Mus.* 10: 1-58.

SMART, C.D.
1961 A guide to the description of fish hooks. *N.Z. Archaeol. Ass. Newsl.* 4 (3): 10-16.

TROTTER, M.M.
1975 Archaeological investigations at Redcliffs, Canterbury, N.Z. *Rec. Canterbury Mus.* 9 (3): 189-220.

TROWER, D.
1962 Opito Beach: two sites. *N.Z. Archaeol. Ass. Newsl.* 5 (1): 43-46.

WALLS, J.Y.
1974 Argillite quarries of the Nelson mineral belt. *N.Z. Archaeol. Ass. Newsl.* 17 (1): 37-43.